

## Rapid Watershed Assessment

### Snake River

(MN) HUC: 07030003



# DRAFT

Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land-owners and local leaders set priorities and determine the best actions to achieve their goals.

## Introduction

The Snake River 8-Digit Hydrologic Unit Code (HUC) subbasin is located in the Northern Lakes and Forest and North Central Hardwoods Ecoregions of Minnesota. This largely forested watershed is 645,587 acres in size. Approximately seventy five percent of the land in this HUC is privately owned, and the remainder is tribal, state or federally owned land.

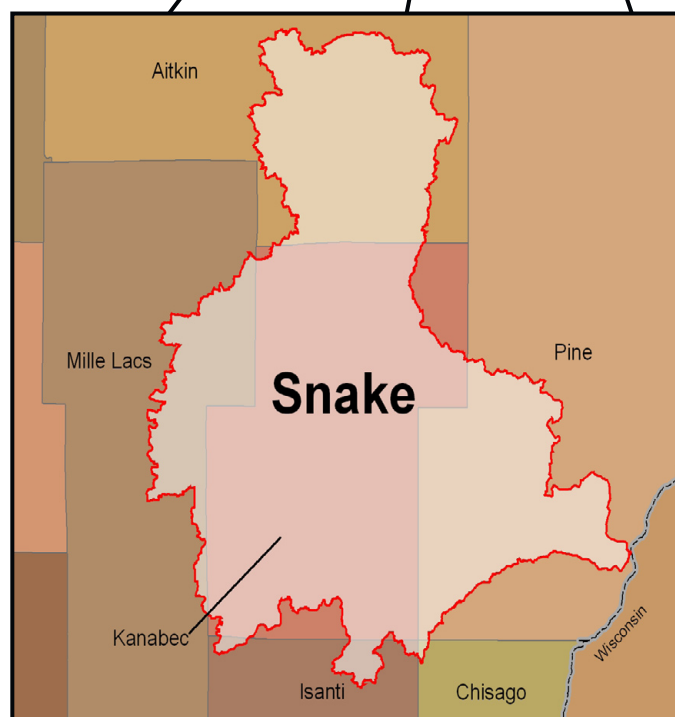
Assessment estimates indicate 1,113 farms located in the watershed. Approximately seventy one percent of the operations are less than 180 acres in size, twenty seven percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres in size. Average farm size in the basin is 44 acres.

The main resource concerns in the watershed are Excessive erosion, Woodland Management, Surfacewater Quality, Streambank Stabilization, Groundwater Quality and Quantity, Wetland management and addressing impaired waters.



### County Totals

<b>County</b>	<b>Acres in HUC</b>	<b>% HUC</b>
Aitkin	133,364	20.7%
Pine	129,456	20.1%
Mille Lacs	64,782	10.0%
Kanabec	308,675	47.8%
Isanti	8,677	1.3%
Chisago	632	0.1%
<b>Total acres:</b>	<b>645,587</b>	<b>100%</b>



## Physical Description

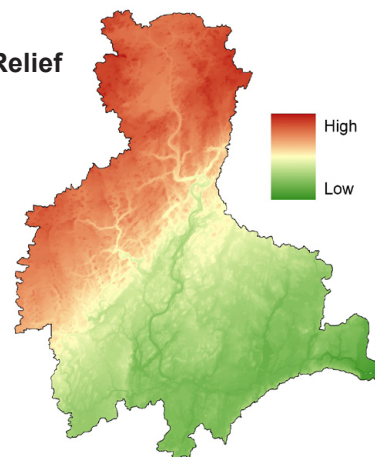
Elevation in the subbasin ranges from 800 to 1420 feet above mean sea level (MSL). The highest values largely occur in the and Northern and Western portions of the watershed, while lower values are found across the Southern regions.

Precipitation in the watershed ranges from 29 to 31 inches annually. Evaporation estimates are between 28 to 32 inches annually (Minnesota State Climatologists Office, 1999).

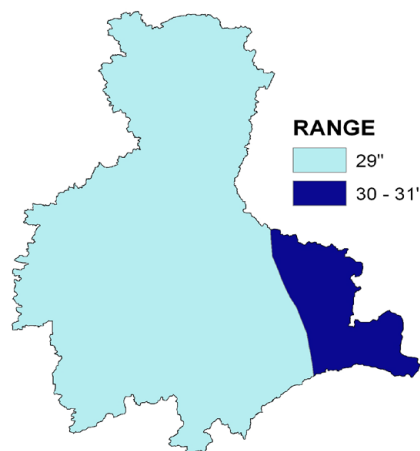
Predominate land uses / land covers across the subbasin are Forest (48%), Wetlands (14%), Grass Pasture/Hay (24%), Rowcrops (8%), and Residential/Commercial Development (3.6%).

Agricultural land use within the Snake River watershed accounts for approximately 35% of the available acres. Development pressure is moderate, with some farms, timberland, and shorefront being parceled out for development, recreation, or vacation homes.

Relief

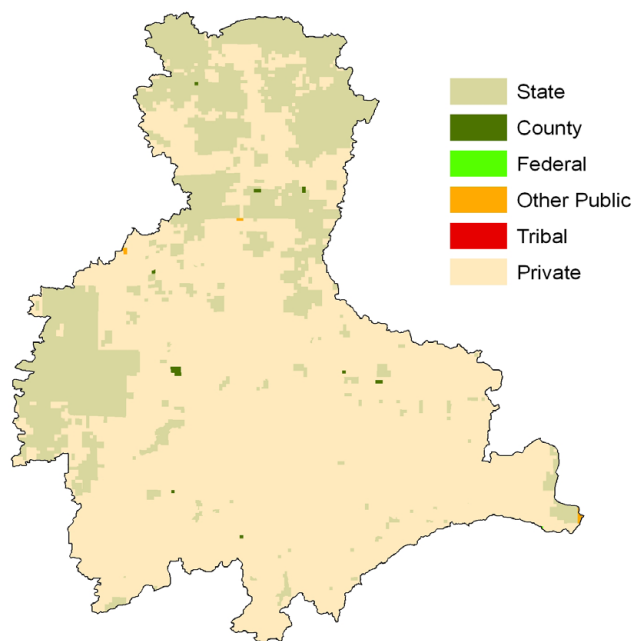


Average Precipitation



## Ownership

Ownership Type	Acres	% of HUC
Conservancy	-	-
County	760	0.1
Federal	10	0.0
State	162,925	25.2
Other	339	0.1
Tribal	4	0.0
Private Major	-	-
Private	481,550	74.6
<b>Total Acres:</b>	<b>645,587</b>	<b>100</b>



\* Ownership totals derived from MN GAP Stewardship Coverage data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.



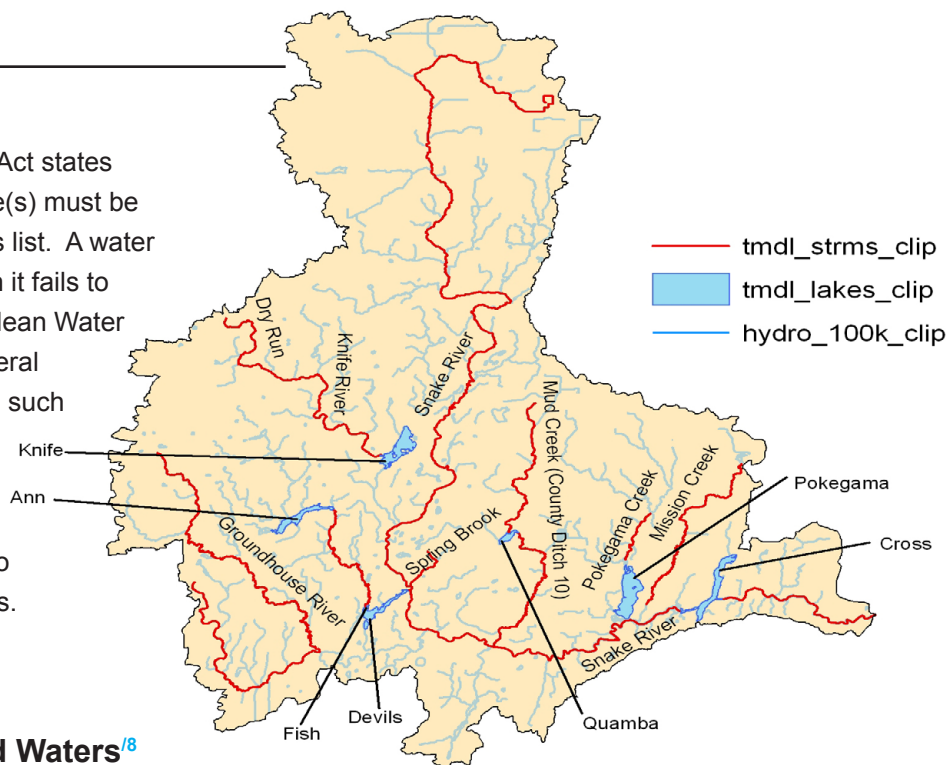


**Physical Description (continued)**

		ACRES	cu. ft/sec	
Stream Flow Data	USGS 05338500 SNAKE RIVER NEAR PINE CITY, MN	2008 Total Avg.	832	
		May – Sep. Avg	1009	
Stream Data <sup>14</sup> (*Percent of Total HUC Stream Miles)		Miles	Percent	
	Total Miles – Major (100K Hydro GIS Layer)	962.9	---	
	303d/TMDL Listed Streams (DEQ)	228.5	23.7%	
Riparian Land Cover/Land Use <sup>15</sup> (Based on a 100-foot buffer on both sides of all streams in the 100K Hydro GIS Layer)	Land Use Type	Acres	Percent	
	Forest	9,275	40.0%	
	Grain Crops	0	0.0%	
	Grass, etc	4,049	17.5%	
	Orchards	0	0.0%	
	Row Crops	1,117	4.8%	
	Shrub etc	34	0.1%	
	Wetlands	6,314	27.2%	
	Residential/Commercial	599	2.6%	
	Open Water	1,794	7.7%	
	Total Buffer Acres:	23,181	100%	
Crop and Pastureland Land Capability Class <sup>16</sup> (Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)	1 – slight limitations	22,700	10%	
	2 – moderate limitations	129,400	56%	
	3 – severe limitations	18,400	8%	
	4 – very severe limitations	13,300	6%	
	5 – no erosion hazard, but other limitations	0	0%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	35,100	15%	
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat	11,900	5%	
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply	0	0%	
	Total Croplands & Pasturelands	230,800	-	
	TYPE OF LAND	ACRES	% of Irrigated Lands	% of Cropland
Irrigated Lands <sup>17</sup> (Adjusted 2002 NASS Irrigated Cropland Totals)	Cultivated Cropland / Pastureland	2,290	100%	1%
	Uncultivated Cropland	0	0%	0%
	Total Irrigated Lands	2,290	---	1%

## Assessment of Waters

Section 303(d) of the Clean Water Act states that water bodies with impaired use(s) must be placed on a state's impaired waters list. A water body is "Impaired" or polluted when it fails to meet one or more of the Federal Clean Water Act's water quality standards. Federal Standards exist for basic pollutants such as sediment, bacteria, nutrients, and mercury. The Clean Water Act requires the Minnesota Pollution Control Agency (MPCA) to identify and restore impaired waters.



## 2006 Minnesota 303d Listed Waters<sup>8</sup>

Waterbody Name	Impairment	Affected Use
St Croix River Kettle R to Snake R	Hg, PCB	Aquatic Consumption
Snake River Mission Cr to St. Croix R	Hg	Aquatic Consumption
Snake River Mud Cr to Mission Cr	Hg	Aquatic Consumption
Mud Creek (County Ditch 10) Headwaters to Snake R	B-FI	Aquatic Life
Snake River Fish Lk Outlet to Groundhouse R	Hg	Aquatic Consumption
Snake River Chelsey Bk to Knife R	Hg	Aquatic Consumption
Snake River Headwaters to Hay Cr	B-F, Hg	Aquatic Consumption and Aquatic Life
Ann River Headwaters (Ann Lk) to Snake R	B-F	Aquatic Life
Groundhouse River Headwaters to S Fk Groundhouse R	B-FI, FC	Aquatic Life and Recreation
Spring Brook Headwaters to Snake R	B-F	Aquatic Life
Snake River Hay Cr to Chelsey Bk	Hg	Aquatic Consumption
Snake River Groundhouse R to Mud Cr	Hg	Aquatic Consumption
Snake River Knife R to Fish Lk Outlet	Hg	Aquatic Consumption
Pokagama Creek E Pokagama Cr to Unnamed Cr	B-I	Aquatic Life
Dry Run Dry Run to Unnamed Cr	B-I	Aquatic Life
Groundhouse River, South Fork Headwaters to Ground	B-I	Aquatic Life
Mission Creek Unnamed Lk (58-00173) to T39 R21W S3	B-FI	Aquatic Life
Knife River Dry Run to Knife Lk	B-FI	Aquatic Life
St Croix River Snake R to Wood R	Hg, PCB	Aquatic Consumption
Quamba	Excess nutrients	Aquatic Recreation
Knife	Excess nutrients	Aquatic Recreation
Devils	Hg	Aquatic Consumption
Fish	Hg, Excess nutrients	Aquatic Recreation and Consumption
Ann	Excess nutrients	Aquatic Recreation
Cross	Excess nutrients	Aquatic Recreation
Pokagama	Excess nutrients	Aquatic Recreation

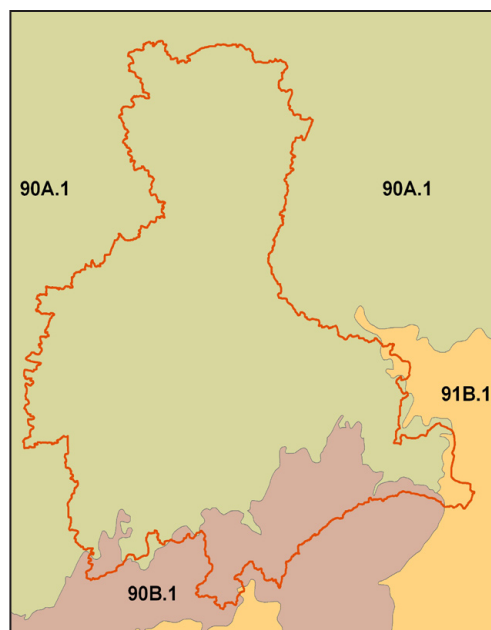
## Common Resource Areas

A Common Resource Area (CRA) map delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area.

**The Snake River Watershed encompasses three common resource areas, CRA 90A.1, 90B.1, and 91B.1** <sup>/9</sup>

**90A.1 Loamy Till Ground Moraines and Drumlins:** Nearly level to moderately steep, loamy, sandy, and organic soils. Mixed deciduous and coniferous forest is the primary land use with some glacial lakes and wetlands. Scattered cropland and grazing land are present. Cropland productivity is limited by the short length of the growing season. Primary resource concerns are timber management, wildlife habitat, recreation and agricultural forage production. Surface water quality is a localized concern.

**90B.1 Dense Till Ground Moraine:** Nearly level and gently sloping moderately well and somewhat poorly drained loamy soils underlain by loamy glacial residuum and bedrock. Mostly cropland and grazing land, with areas of mixed deciduous and coniferous forest, wetlands, and a few lakes. Dairy and beef production with some cash grain are the primary agricultural enterprises. Primary resource concerns include nutrient management, cropland soil erosion, grazing land productivity, and forestry management.



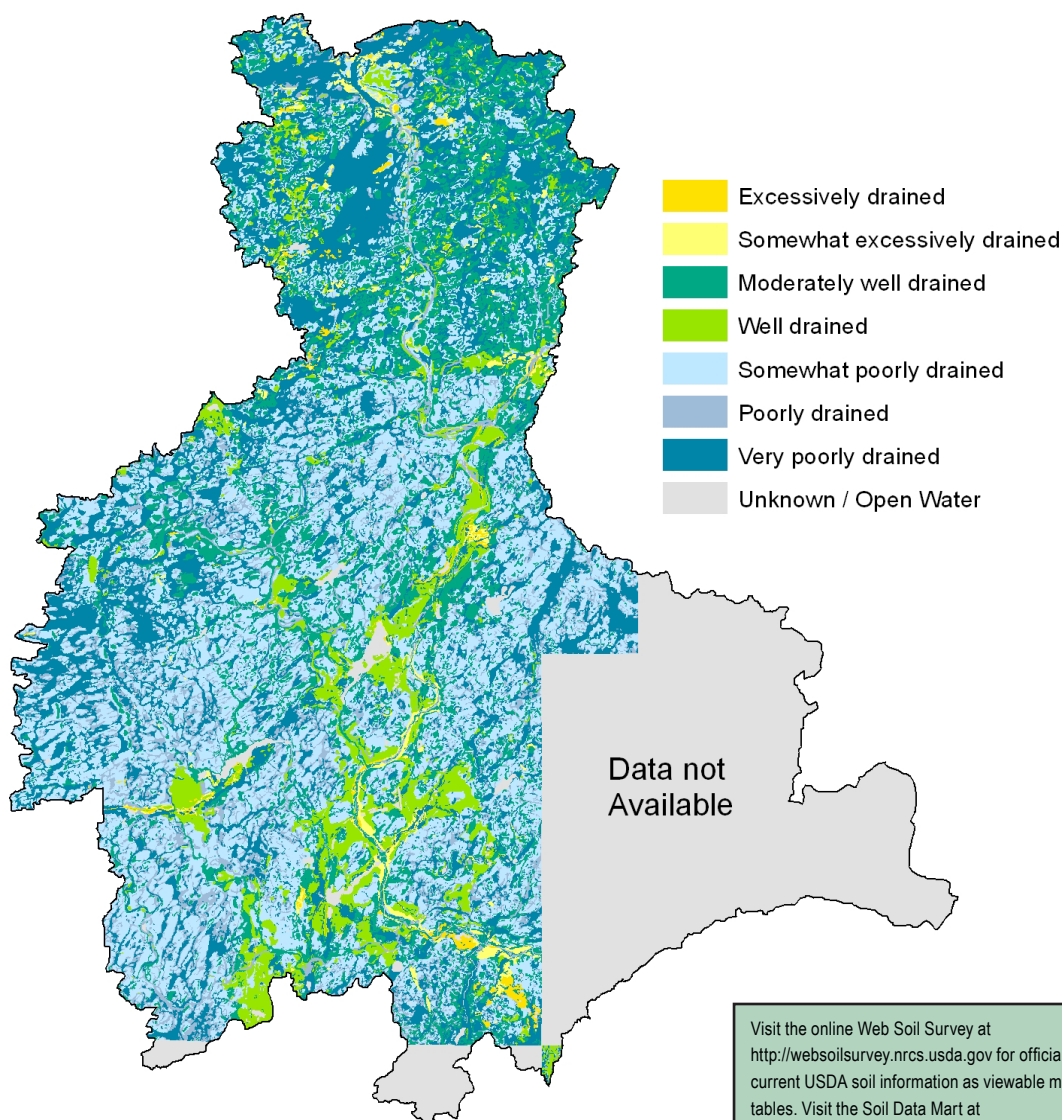
Only the major CRA units are described above.  
 For further information, go to:  
<http://soils.usda.gov/survey/geography/cra.html>

**91B.1 Anoka Sand Plain and Northwest Wisconsin Outwash:** Gently sloping to moderately steep outwash plains and moraines. Soils range from excessively drained sandy soils to very poorly drained organic soils. Mostly deciduous and coniferous forestland, pasture with more cropland in the western part. The primary resource concerns are forestland productivity, erosion control on cropland and timbered areas during harvest, upland wildlife habitat management, and recreation.

## Drainage Classification

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil.

Seven classes of natural soil drainage are recognized—excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the “Soil Survey Manual.”



Visit the online Web Soil Survey at  
<http://websoilsurvey.nrcs.usda.gov> for official and  
 current USDA soil information as viewable maps and  
 tables. Visit the Soil Data Mart at  
<http://soildatamart.usda.gov> to download SSURGO  
 certified soil tabular and spatial data.

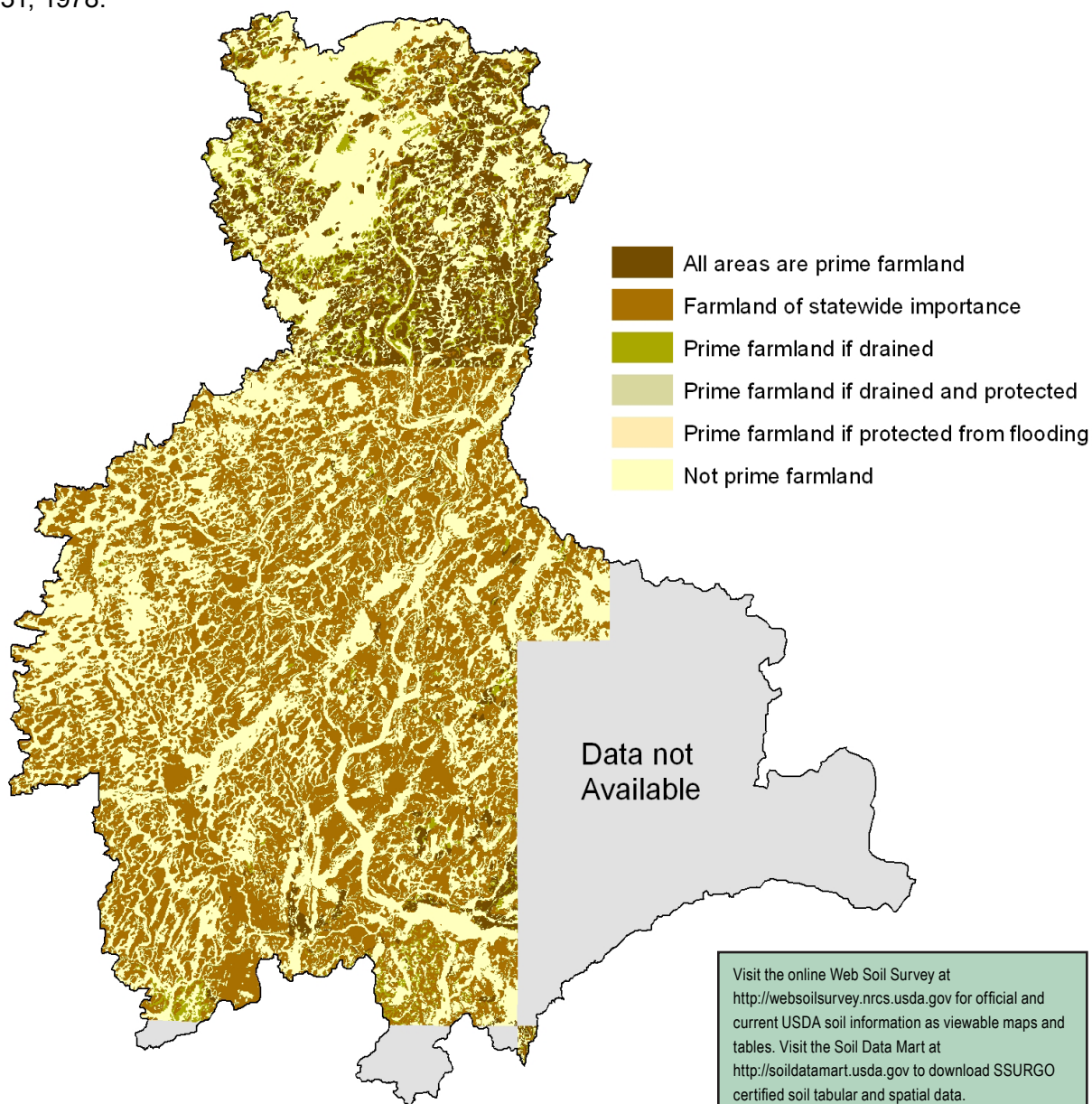


## Farmland Classification

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland.

Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops.

NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No 21, January 31, 1978.

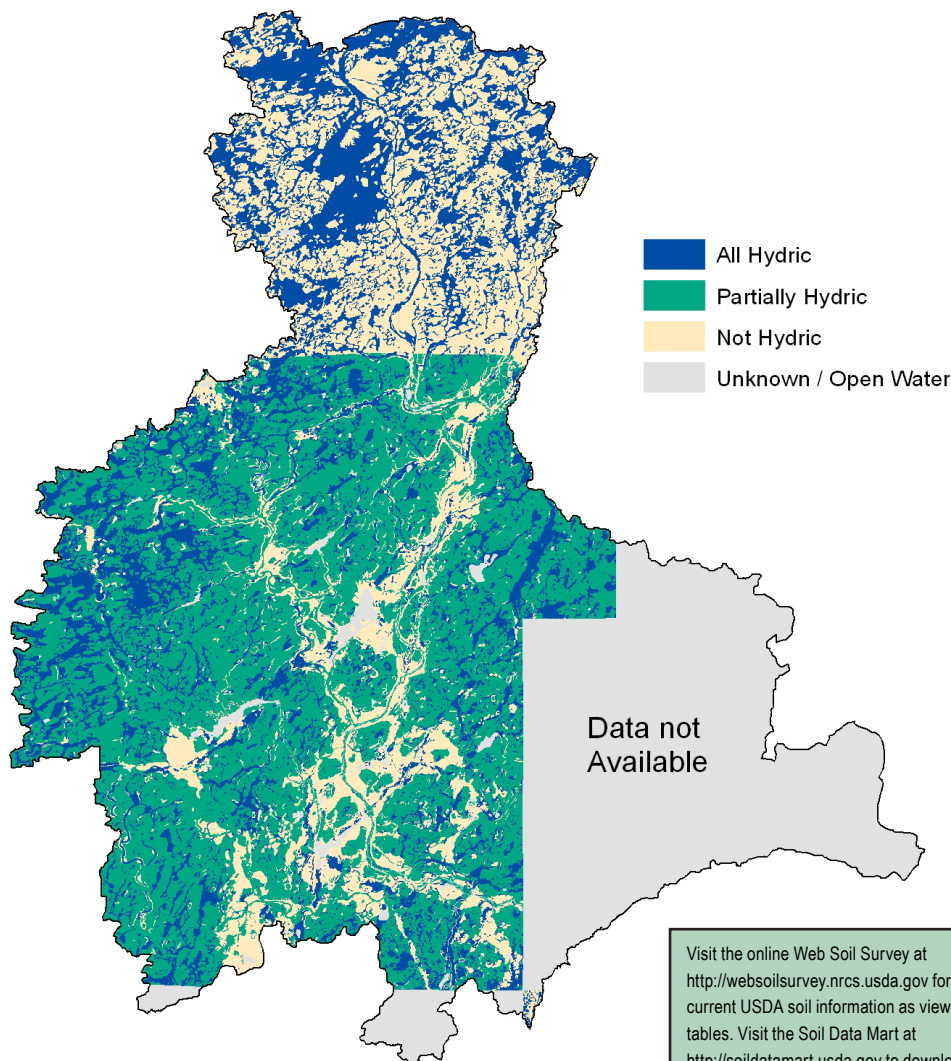




## Hydric Soils

This rating provides an indication of the proportion of the map unit that meets criteria for hydric soils. Map units that are dominantly made up of hydric soils may have small areas, or inclusions of nonhydric soils in the higher positions on the landform. Map units of dominantly non-hydric soils may therefore have inclusions of hydric soils in the lower positions on the landform.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as “soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part” (Federal Register 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

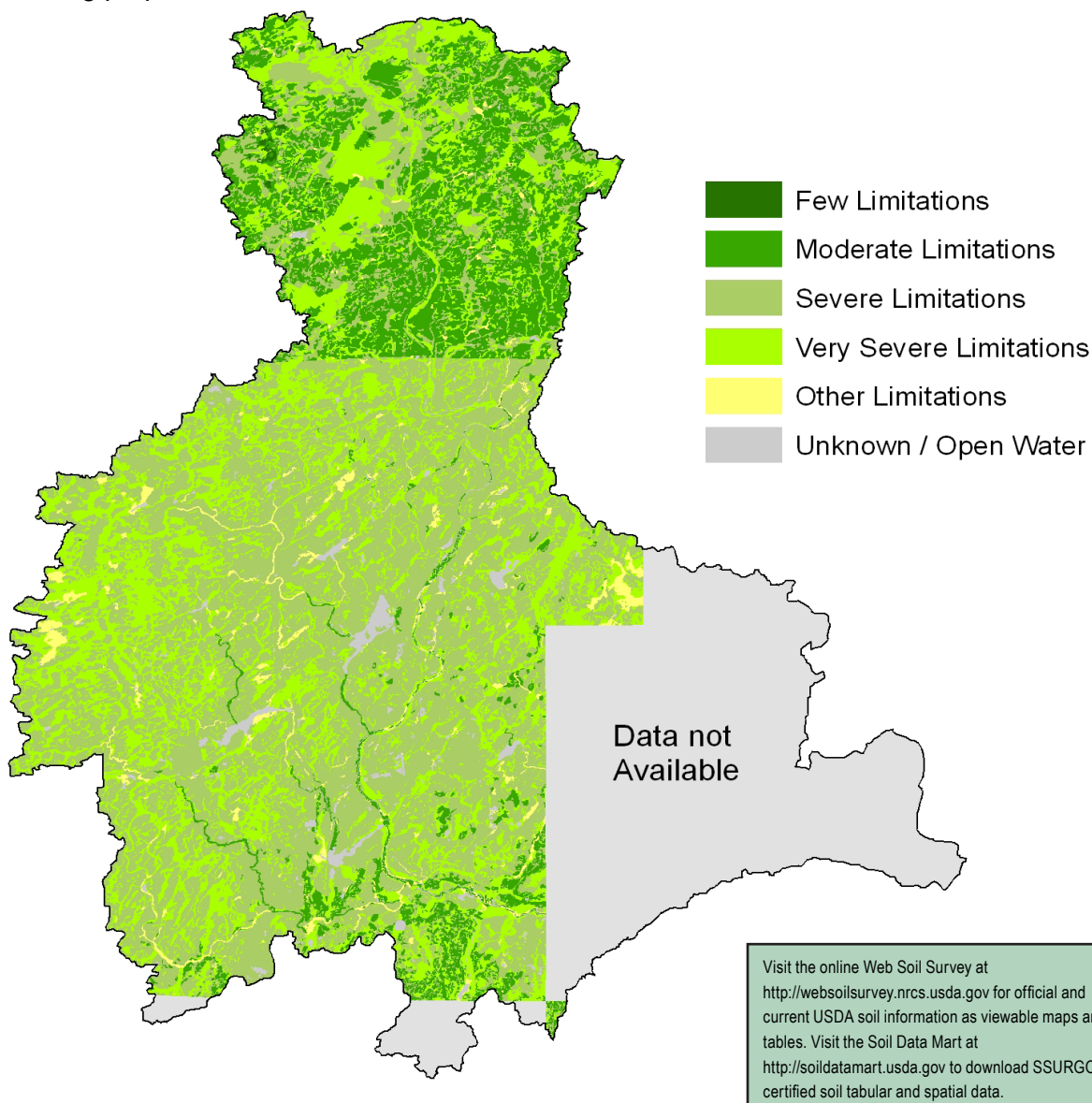


Visit the online Web Soil Survey at  
<http://websoilsurvey.nrcs.usda.gov> for official and  
 current USDA soil information as viewable maps and  
 tables. Visit the Soil Data Mart at  
<http://soildatamart.usda.gov> to download SSURGO  
 certified soil tabular and spatial data.

## Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management.

The criteria used in grouping the soils does not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.



*Note: Historical Hydric Soil Determination Standards, scale, and methodology can vary on a county-to-county basis, leading to irregularities in thematic maps representing land capability classification determinations.*

## Performance Results System Data

Watershed Name: Snake				Watershed Number: 07030004						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL
Total Conservation Systems Planned (acres)	104	2,027	0	947	2,789	N/A	6,820	6,319	5,026	24,032
Total Conservation Systems Applied (acres)	274	2,997	0	2,141	2,141	N/A	5,654	6,106	7,314	26,627
Conservation Practices										
Total Waste Management (313) (numbers)	0	1	0	4	1	1	1	1	0	9
Riparian Forest Buffers (391) (acres)	0	5	21	35	33	7	0	0	0	101
Erosion Control Total Soil Saved (tons/year)	0	127,926	1,454	2,120	3,503	N/A	N/A	N/A	N/A	135,003
Total Nutrient Management (590) (Acres)	104	525	163	361	507	244	218	218	2,305	4,645
Pest Management Systems Applied (595A) (Acres)	0	0	0	70	62	0	0	0	819	951
Prescribed Grazing 528a (acres)	0	110	388	61	0	0	626	612	612	2,409
Tree & Shrub Establishment (612) (acres)	10	121	110	113	87	54	8	12	10	525
Residue Management (329A-C) (acres)	93	763	0	103	250	540	540	2,051	323	4,663
Total Wildlife Habitat (644 - 645) (acres)	729	746	277	284	1,814	475	284	1,856	2,844	9,309
Total Wetlands Created, Restored, or Enhanced (acres)	3	9	22	14	9	0	18	0	21	96
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	104	829	88	523	465	N/A	209	1,207	0	3,425
Wetlands Reserve Program	0	0	0	0	0	N/A	0	0	0	0
Environmental Quality Incentives Program	0	0	388	733	797	N/A	2,171	2,982	4,011	11,082
Wildlife Habitat Incentive Program	20	154	52	462	9	N/A	503	41	349	1,590

## THREATENED AND ENDANGERED SPECIES OF THE BASIN <sup>14</sup>

NRCS assists in the conservation of threatened and endangered species and avoids or prevents activities detrimental to such species. NRCS' concern for these species includes the species listed by the Secretary of the Interior (as published in the Federal Register) and species designated by state agencies. The following is a list of threatened, endangered, candidate species and species of special concern that occur in the basin.



Scientific Name	Common Name	Type	Scientific Name	Common Name	Type
<i>Acipenser fulvescens</i>	Lake Sturgeon	Zoological	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological
<i>Actinonaias ligamentina</i>	Mucket	Zoological	<i>Hemidactylium scutatum</i>	Four-toed Salamander	Zoological
<i>Agapetus tomus</i>	A Caddisfly	Zoological	<i>Hydrocotyle americana</i>	American Water-pennywort	Botanical
<i>Alasmodonta marginata</i>	Elktoe	Zoological	<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Zoological
<i>Botrychium lanceolatum</i>	Triangle Moonwort	Botanical	<i>Juglans cinerea</i>	Butternut	Botanical
<i>Botrychium minganense</i>	Mingan Moonwort	Botanical	<i>Lasmigona compressa</i>	Creek Heelsplitter	Zoological
<i>Botrychium mormo</i>	Goblin Fern	Botanical	<i>Lasmigona costata</i>	Fluted-shell	Zoological
<i>Botrychium oneidense</i>	Blunt-lobed Grapefern	Botanical	<i>Ligumia recta</i>	Black Sandshell	Zoological
<i>Botrychium pallidum</i>	Pale Moonwort	Botanical	<i>Marpissa grata</i>	A Jumping Spider	Zoological
<i>Botrychium simplex</i>	Least Moonwort	Botanical	<i>Najas gracillima</i>	Thread-like Naiad	Botanical
<i>Buteo lineatus</i>	Red-shouldered Hawk	Zoological	<i>Obovaria olivaria</i>	Hickorynut	Zoological
<i>Carex woodii</i>	Wood's Sedge	Botanical	<i>Paradamoetas fontana</i>	A Jumping Spider	Zoological
<i>Coturnicops noveboracensis</i>	Yellow Rail	Zoological	<i>Percina evides</i>	Gilt Darter	Zoological
<i>Cyclonaias tuberculata</i>	Purple Wartyback	Zoological	<i>Pleurobema coccineum</i>	Round Pigtoe	Zoological
<i>Dendroica cerulea</i>	Cerulean Warbler	Zoological	<i>Poa paludigena</i>	Bog Bluegrass	Botanical
<i>Elliptio dilatata</i>	Spike	Zoological	<i>Potamogeton bicipulatus</i>	Snailseed Pondweed	Botanical
<i>Emydoidea blandingii</i>	Blanding's Turtle	Zoological	<i>Potamogeton vaseyi</i>	Vasey's Pondweed	Botanical



## RESOURCE CONCERNS

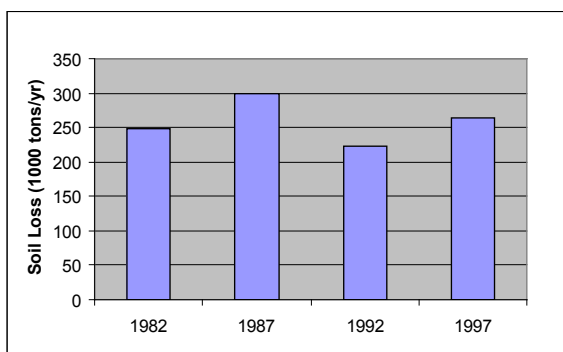
County Soil and Water Conservation Districts in the watershed have identified the following resource concerns as top priorities for conservation and cost sharing efforts:

- Soil Quality, Excessive Erosion.** Soil erosion from exposed surface areas, streambank and lakeshore areas, and roadside erosion are major conservation issues in the watershed.
- Woodland Management.** Districts seek to manage timber harvest and forestry practices to maintain 40% or less open space in riparian and priority areas. Management opportunities include planting trees or shrubs, timber stand improvement, timber sales, conversion to coniferous forests in red-clay areas, enhancing wildlife habitat, and more.
- Surface Water Quality, Nutrients, Sediment & Priority Pollutants.** Excessive amounts of sediments, nutrients, and bacteria degrade the water quality causing a fish community with depressed populations and limited diversity. Sediment, Mercury and other heavy metal levels are affecting the health of Aquatic communities, and affecting the consumption of fish in many areas of concern.
- Ground Water Quality.** Nutrients, Organics, Animal and Human Wastewater management. Aging septic systems, feedlot runoff, nutrient runoff, tilling practices, improper closure of old manure pits, and abandoned wells all pose threats to groundwater quality throughout the region. Improved management of wastewater ensures safe water for all uses.
- Ground Water Quantity.** Land alterations have transformed the flow, retention, and replenishment of the hydrologic cycle. Pattern tiling, ditching, wetland removal, development, stormwater drainage, excessive groundwater use, etc. have resulted in the cumulative effect of rapidly transporting a greater amount of water to major rivers and streams, and away from groundwater recharge potential.
- Wetland Management.** Area groups recognize that development and logging have had major impacts on wetlands. Physical changes have taken place, wildlife and plant species composition have been altered, greatly changing the function and value of the areas plentiful wetlands.



### NRI Erosion Estimates<sup>13</sup>

- NRI estimates for Sheet and rill erosion by water on cropland pastureland **increased** by approximately 16,100 tons of soil (6.5%) between the 1982 and 1997 reporting periods.





## Socioeconomic and Agricultural Data (Relevant)

Estimations for the Snake River subbasin indicate a current population of approximately 26,010 people. Median household income throughout the district is \$38,335 yearly, roughly 83% of the national average. Unemployment in the subbasin is estimated at 5.9%, and approximately 9% of the residents in the watershed are living below the national poverty level.

Assessment estimates indicate 1,113 farms located in the watershed. Approximately seventy one percent of the operations are less than 180 acres in size, twenty seven percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres in size. Of the 1,083 operators in the basin, fifty percent percent are full time producers not reliant on off farm income.



<b>(MN) HUC# 7030004</b>		<b>Total Acres:</b>	<b>645,587</b>
<b>Population Data*</b>	Watershed Population	26,009	
	Unemployment Rate	5.9%	
	Median Household Income	38,335	
	% below poverty level	9%	
	Median Value of Home	101,233	
<b>Farm Data</b>	# of Farms	1,113	
	# of Operators	1,083	<b>Percent</b>
	# of Full Time Operators	545	50%
	# of Part Time Operators	538	50%
	<b>Total Cropland Acres</b>	<b>120,265</b>	<b>18.6%</b>
<b>Farm Size</b>	1 to 49 Acres	176	31%
	50 to 179 Acres	224	40%
	180 to 499 Acres	123	22%
	500 to 999 Acres	29	5%
	1,000 Acres or more	12	2%
	<b>Average Farm Size</b>	<b>44</b>	
<b>Livestock &amp; Poultry</b>	Cattle - Beef	10,024	20%
	Cattle - Dairy	4,578	9%
	Chicken	3,241	6%
	Swine	5,515	11%
	Turkey	71	0%
	Other	27,700	54%
	<b>Animal Count Total:</b>	<b>51,128</b>	
	<b>Total Permitted AFOs:</b>	<b>154</b>	
<b>Chemicals (Acres Applied)</b>	Insecticides	3,839	
	Herbicides	27,710	
	Wormicides	18	
	Fruiticides	937	
	<b>Total Acres Treated</b>	<b>32,504</b>	
	<b>% State Chemical Totals</b>	<b>0.2%</b>	

\* Adjusted by percent of HUC in the county or by percent of block group area in the HUC, depending on the level of data available

## Watershed Projects, Plans and Monitoring

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- **Biological & Toxicological Assessment**  
Minnesota Pollution Control Agency
- **Aitkin County Water Management Plan**  
Aitkin County SWCD
- **Chisago County Water Plan**  
Chisago County SWCD
- **Isanti County Comprehensive Water Plan**  
Isanti County SWCD, BWSR
- **Pine County Comprehensive Plan**  
Pine County SWCD
- **Conservation Action Planning (CAP)**  
The Nature Conservancy
- **Sediment Research and Monitoring**  
US Geological Survey, St Mary's University
- **Water Quality Monitoring**  
MN Waters, Area Citizens
- **Lakescaping for Wildlife and Water Quality Initiative**  
MN Department of Natural Resources, MN Waters
- **Kanabec County Comprehensive Local Water Plan**  
Minnesota Pollution Control Agency
- **Mille Lacs Comprehensive Water Plan**  
Mille Lacs SWCD
- **Mussel Resource Survey**  
Minnesota Department of Natural Resources
- **Snake River Enhancement Project**  
Snake River Watershed Management Board
- **White Pine Restoration Project**  
University of Minnesota
- **Phosphorus Index Study: St Croix Basin**  
University of Minnesota, US Geological Survey
- **St. Croix Basin Water Resources Team**  
MN Pollution Control Agency

\* Have a watershed project you'd like to see included? Submit suggestions online @ <http://www.mn.nrcs.usda.gov/technical/rwa/>

## Conservation Districts, Organizations & Partners

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- **Aitkin County SWCD**  
130 Southgate Dr, Aitkin, MN 56431  
Phone (218) 927-6565
- **Chisago County SWCD**  
38814 Third Ave, North Branch, MN 55056  
Phone (651) 674-2333
- **Isanti County SWCD**  
380 Garfield St S, Cambridge, MN 55008  
Phone (763) 689-3224
- **Friends of the St. Croix Headwaters**  
PO Box 276 Gordon, WI 54838  
<http://fotsch.org>
- **Friends of the Snake River**  
<http://www.snakerivermn.org>
- **Kanabec SWCD**  
2008 Mahogany St Ste 3, Mora, MN 55051  
Phone (320) 679-3982
- **Mille Lacs SWCD**  
1016 5th St SE, Milaca, MN 56353  
Phone (320) 983-2160
- **Minnesota USDA/NRCS**  
375 Jackson Street #600 Saint Paul, MN 55101  
Phone (651) 602-7900
- **Pine County SWCD**  
260 Morris Ave N, Hinkley, MN 55037  
Phone (320) 384-7431
- **Snake River Watershed Management Board**  
18 N. Vine Street #291 Mora, MN 55051  
Phone (320) 679-6456

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## Footnotes / Bibliography

1. Ownership Layer – Source: MN Stewardship Data: Minnesota Department of Natural Resources, Section of Wildlife, BRW, Inc, 2007. This is the complete GAP Stewardship database containing land ownership information for the entire state of Minnesota. Date of source material is variable and ranges from 1976 to 2007, although a date range of 1983 to 1985 predominates. Land interest is expressed only when some organization owns or administers more than 50% of a forty except where DNR could create sub-forty accuracy polygons.
2. National Land Cover Dataset (NLCD) - Originator: U.S. Geological Survey (USGS); Publication date: 19990631; Title: Minnesota Land Cover Data Set, Edition: 1; Geospatial data presentation form: Raster digital data; Publisher: U.S. Geological Survey, Sioux Falls, SD, USA.
3. Ownership layer classes grouped to calculate Public ownership vs. Private and Tribal ownership by Minnesota NRCS Rapid Watershed Assessment Staff. Land cover / Land use data was then extracted from the National Landcover Dataset Classification System and related to ownership class polygons.
4. U.S. Geological Survey National Hydrography Dataset (NHD) 1:100,000-scale Digital Line Graph (DLG) medium resolution hydrography data, integrated with reach-related information from the U.S. Environmental Protection Agency Reach File Version 3.0 (RF3). The Hydro 100k layer was compared to MPCA's 303(d) data to derive percentage of listed waters.
5. Land Cover / Land Use / Hydro 100k Buffer. Using the 100k Hydrology dataset, All streams within HUC were spatially buffered to a distance of 100 ft. National Landcover Dataset attributes were extracted for the spatial buffer to demonstrate the vegetation and landuse in vulnerable areas adjacent to waterways.
6. Land Capability Class. ESTIMATES FROM THE 1997 NRI DATABASE (REVISED DECEMBER 2000) REPLACE ALL PREVIOUS REPORTS AND ESTIMATES. Comparisons made using data published for the 1982, 1987, or 1992 NRI may produce erroneous results. This is because of changes in statistical estimation protocols and because all data collected prior to 1997 were simultaneously reviewed (edited) as 1997 NRI data were collected. All definitions are available in the glossary. In addition, this December 2000 revision of the 1997 NRI data updates information released in December 1999 and corrects a computer error discovered in March 2000. For more information: <http://www.nrcs.usda.gov/technical/NRI/>
7. 2002 NASS Irrigated Land Estimates. Irrigated land: Land that shows evidence of being irrigated during the year of the inventory or during two or more years out of the last four years. Water is supplied to crops by ditches, pipes, or other conduits. Water spreading is not considered irrigation; it is recorded as a conservation practice. For more information: <http://www.agcensus.usda.gov/>
8. 303(d) Stream data. Minnesota's Final Impaired Waters (per Section 303(d) Clean Water Act), 2006. Data obtained from Minnesota Pollution Control Agency (MPCA). The Minnesota Pollution Control Agency (MPCA) helps protect state water by monitoring quality, setting standards and controlling inputs through the development of TMDL plans. <http://www.pca.state.mn.us/water/tmdl/index.html#maps>.

## Footnotes / Bibliography (continued)

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9. National Coordinated Common Resource Area (CRA) Geographic Database. A Common Resource Area (CRA) map delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area

10. Soil Survey Geographic Database (SSURGO) Tabular and spatial data obtained from NRCS Soil Data Mart at <http://soildatamart.nrcs.gov>. Publication dates vary by county. Component and layer tables were linked to the spatial data via SDV 5.1 and ARCGIS 9.1 to derive the soil classifications presented in these examples. Highly Erodible Land Classification Data obtained from USDA/NRCS EFOTG Section II, County Soil Data. HEL classifications were appended to SSURGO spatial data via an ARCEdit session. Addendum and publication dates vary by county.

11. Lands removed from production through farm bill programs. County enrollment derived from the following: CRP Acres: [www.fsa.usda.gov/crpstorpt/07Approved/r1sumyr/mn.htm](http://www.fsa.usda.gov/crpstorpt/07Approved/r1sumyr/mn.htm) (7/30/04). CREP Acres: <http://www.bwsr.state.mn.us/easements/crep/easementssummary.html> (7/31/03). WRP Acres: NRCS (8/16/04). Data were obtained by county and adjusted by percent of HUC in the county.

12. Socioeconomic and Agricultural Census Data were taken from the U.S. Population Census, 2000 and 2002 Agricultural Census and adjusted by percent of HUC in the county or by percent of zip code area in the HUC, depending on the level of data available. Data were also taken from MPCA AFO/CAFO counts provided by county for 2005.

13. 1997 NRI Estimates for sheet and rill erosion (WEQ & USLE). The NRI estimates sheet and rill erosion together using the Universal Soil Loss Equation (USLE). The Revised Universal Soil Loss Equation (RUSLE) was not used in the 1997 NRI. RUSLE was not available for previous inventories, therefore the use of USLE was continued to preserve the trending capacity of the NRI database. Wind erosion is estimated using the Wind Erosion Equation (WEQ). For further information visit <http://www.mn.nrcs.usda.gov/technical/nri/findings/erosion.htm>

14. Federally listed endangered and threatened species counts obtained from NRCS Field Office Technical Guide, Section II, Threatened and Endangered List. <http://www.nrcs.usda.gov/Technical/efotg/>. Where listed, Essential fish habitat as established by Magnuson-Stevens Fishery Conservation and Management Act, Public Law 94-265, as amended through October 11, 1996 <http://www.nmfs.noaa.gov/sfa/magact/>

15. Watershed Projects, Plans, Monitoring. Natural Resources Conservation Service, Watershed Projects Planned and Authorized, <http://www.nrcs.usda.gov/programs/watershed/Purpose>. Additional Information on listed individual projects can be obtained from the noted parties.